Sixthly, That any Iron may, in a very little time, be *case hardned*, as the Trades-men call it, by casing the iron to be hardned with clay, and putting between the clay and iron a good quantity of a mixture of *Urine*, *Soot*, *Sea-salt*, and *Horses hoofs* (all which contein great quantities of Saline bodies) and then putting the case into a good strong fire, and keeping it in a considerable degree of heat for a good while, and afterwards heating, and quenching or cooling it suddenly in cold water.

Seventhly, That all kind of vitrify'd substances, by being suddenly cool'd, become very hard and brittle. And thence arises the pretty *Phænomena* of the Glass Drops, which I have already further explained in its own place.

Eighthly, That those metals which are not so apt to vitrifie, do not acquire any hardness by quenching in water, as Silver, Gold, &c.

These considerations premis'd, will, I suppose, make way for the more easie reception of this following Explication of the *Phænomena* of hardned and temper'd Steel. That Steel is a substance made out of Iron, by means of a certain proportionate *Vitrification* of several parts, which are so curiously and proportionately mixt with the more tough and unalter'd parts of the Iron, that when by the great heat of the fire this vitrify'd substance is melted, and consequently rarify'd, and thereby the pores of the Iron are more open, if then by means of dipping it in cold water it be suddenly cold, and the parts hardned, that is, stay'd in that same degree of *Expansion* they were in when hot, the parts become very hard and brittle, and that upon the same account almost as small parcels of glass quenched in water grow brittle, which we have already explicated. If after this the piece of Steel be held in some convenient heat, till by degrees certain colours appear upon the surface of the brightned metal, the very hard and brittle tone of the metal, by degrees relaxes and becomes much more tough and soft; namely, the action of the heat does by degrees loosen the parts of the Steel that were before streached or set *atilt* as it were, and stayed open by each other, whereby they become relaxed and set at liberty, whence some of the more brittle interjacent parts are thrust out and melted into a thin skin on the surface of the Steel, which from no colour increases to a deep Purple, and so onward by these *gradations* or consecutions, *White*, *Yellow*, *Orange*, *Minium*, *Scarlet*, *Purple*, *Blew*, *Watchet*, &c. and the parts within are more conveniently, and proportionately mixt; and so they gradually subside into a texture which is much better proportion'd and closer joyn'd, whence that rigidnesse of parts ceases, and the parts begin to acquire their former *ductilness*.

Now, that 'tis nothing but the vitrify'd metal that sticks upon the surface of the colour'd body, is evident from this, that if by any means it be scraped and rubb'd off, the metal underneath it is white and clear; and if it be kept longer in the fire, so as to increase to a considerable thickness, it may, by blows, be beaten off in flakes. This is further confirm'd by this observable, that that Iron or Steel will keep longer from rusting which is covered with this vitrify'd case: Thus also Lead will, by degrees, be all

all turn'd into a litharge; for that colour which
scum'd or shov'd aside, appears to be nothing e
vitrify'd Lead.

This is observable also in some sort, on Brass, Co
Tin, but is most conspicuous in Lead: all those Co
surface of the Metal being nothing else, but a ver
of the heated Metal.

The other Instance we have, is in Animal bodies,
of Pearl-shels, Oyster-shels, and almost all other
whatsoever. This have I also sometimes with pl
in Muscles and Tendons. Further, if you take any
and run it exceedingly thin upon the surface of a sm
lisht metaline body, you shall find the like effects
general, wheresoever you meet with a transparent
that is terminated by reflecting bodies of differing
there will be a production of these pleasing and love

Nor is it necessary, that the two *terminating* Bodi
the same kind, as may appear by the *vitrified Laminæ*
other Metals, one surface of which *Laminæ* is contigu
the Metal, the other to that of the Air.

Nor is it necessary, that these colour'd *Laminæ* sh
thickness, that is, should have their edges and middle
as in a Looking-glass-plate, which circumstance is o
the Plate appear all of the same colour; but they n
that is, have their middles thicker then their edges;
cave, that is, be thinner in the middle then at the ed
cases there will be various coloured rings or lines, wit
tions or orders of Colours; the order of the first fi
wards being Red, Yellow, Green, Blew, *&c.* And t
trary.

But further, it is altogether necessary, that the
where the Colours appear, should be of a determinat
must not be more then such a thickness, for when the
such a thickness, the Colours cease; and besides,
piece of *Muscovy-glass*, where the two ends of two P
ing both single, exhibited two distinct and diffe
in that place where they were united, and constitut
(as I may call it) they appeared transparent and col
condly, may the Plates be *thinner* then such a deterr
always find, that the very outmost Rim of these fla
a white and colourless Ring.

Further, in this Production of Colours there is no
nate Light of such a bigness and no more, nor of a
of that Light, that it should be on this side, and not on
terminating shadow, as in the Prisme, and Rainbow,
we find, that the Light in the open Air, either in or ou
and within a Room, either from one or many Windo

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